

With the Author's Compl.

FOREIGN BODIES IN THE AIR-PASSAGES.

THE SUBSTANCE OF TWO CLINICAL LECTURES DELIVERED IN
THE WESTERN INFIRMARY, GLASGOW.

BY HECTOR C. CAMERON, M.D.,

Surgeon and Lecturer on Clinical Surgery in the Western Infirmary, Glasgow; Surgeon to the Royal Hospital for Sick Children in Glasgow; Consulting Surgeon to the Royal Lunatic Asylum, Gartnavel, Glasgow.

[REPRINTED FROM INTERNATIONAL CLINICS, VOL. III., SECOND SERIES.]

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GENTLEMEN,—A little boy, six years of age, returns home to-day, who was admitted a few weeks ago, having, it was said, “swallowed” a damson-stone four days previously. His father’s account of the accident was as follows. While ~~sitting~~ speaking to a brother, a damson-stone which he was sucking suddenly slipped backward, and he was seized with an alarming difficulty of breathing, rapidly becoming “black in the face.” His mother at once passed her finger into the back of his throat, felt the tip of the stone, and, being unable to hook it up with her finger, pushed it on. After a severe and continued paroxysm of coughing, the child gradually began to improve, and before going to bed seemed quite well. During the night, however, he had another great fit of coughing, which caused so much alarm that his parents sent for a doctor, who gave the opinion that the stone had “gone down the wrong way.” From that time until admission, five days afterwards, he had several fits of coughing, but none very severe. His parents became hopeful, from his comparatively satisfactory condition, that the stone had passed into the stomach, and that his cough, which was now in no way alarming, was due to the irritation caused to the throat by his mother’s violent attempts, in the first instance, to extract the stone.

When I saw the patient, immediately after admission, he seemed very comfortable, and breathed easily, although he had travelled a considerable distance by steamboat and railway. He complained of pain over the right side of the sternum. On auscultation the respiratory murmur was found to be diminished on both sides, but most markedly

on the right; on which side also it had a peculiar whistling character. Shortly after my examination of him, he had a violent but short paroxysm of coughing. Having with some difficulty obtained his father's permission for immediate operation, I at once had the child chloroformed and opened the trachea. The point of a pair of dissecting forceps having been introduced into the tracheal wound and opened, cough immediately supervened, and the stone could be felt striking against the forceps with each expiration. The wound was too small to allow of the stone being shot out, and when it was afterwards enlarged the stone could no longer be felt. After trying unsuccessfully to dislodge it from below with a loop of wire, I passed a pair of long-curved forceps down into the right bronchus, when I at once felt and grasped it. During its withdrawal it slipped from the forceps, but was coughed into the wound and again seized. The patient has made an excellent recovery, although for a time there was a considerable area of consolidation in the left lung, coming on a few days after operation, with fever, quickened respiration, and cough.

The points in this case to which I desire to direct your special attention are principally three in number,—viz., the very alarming symptoms produced by the foreign body at its first entrance and while it still lingered in the neighborhood of the glottis and larynx; the almost complete cessation of symptoms when it sank down into the chest; and, lastly, the satisfactory result of an early opening of the windpipe. These matters deserve now a more extended consideration.

There are two parts of the respiratory passages in which foreign bodies may reside for a considerable time without exciting alarm, or, indeed, much notice; but yet, in the case of both, symptoms will sooner or later arise demanding attention. These two situations are the nostrils and the bronchi. Let me narrate shortly to you the history and symptoms of three typical cases of foreign body in the nostril.

(a) In the summer of 1871 a woman brought her child, three years of age, to the Glasgow Royal Infirmary, when I was giving advice in the out-door department. There was a stinking discharge from the right nostril, of six weeks' duration. The mother stated that this discharge was confined entirely to the one nostril, and her statement was borne out by the fact that the upper lip was scalded opposite the right nostril, but was quite normal in appearance on the left side. The child was otherwise healthy. Various medical men had been consulted, and different astringent and antiseptic applications had been tried, without effect. Suspecting the presence of a foreign body, I probed the cavity of the nostril, but could strike upon nothing hard. In probing, how-

ever, I ruffled up in the floor of the nostril something which had the appearance of a gray slough. Seizing it with forceps, I extracted what turned out to be a piece of cloth, about an inch square, soaked with abominably fetid discharge. On its being washed, the mother recognized from its pattern that it was a fragment from a window-curtain which she had been cutting out and sewing about seven weeks previously. While she was at work the child played on the carpet around, over which cuttings of the cloth were plentifully strewn. The discharge entirely ceased within a few days of the extraction of the foreign body.

(b) On June 13, 1879, a lady brought a little girl to see me, at the request of the late Dr. Fergus, on account of a slight discharge from the right nostril. This had been going on for six months, and during that time the child had been observed to snore somewhat and to be rather restless in sleep. Exploration detected a hard foreign body, which, on extraction, proved to be a metallic shoe-button.

(c) Four years ago a girl, five years old, was brought to see me by her parents on account of discharge from the left nostril of more than three years' duration, giving a distinctly disagreeable odor to the breath. I probed the nostril as well as I could in the case of a restless child, but could feel no foreign body. I wrote, however, to my friend Dr. Sewell, of Helensburgh, whose patient she was, that I felt sure a foreign body was the cause of the mischief, and that it ought to be carefully searched for, if need be after the administration of an anæsthetic. He wrote me lately in regard to the case as follows: "I got it out a week afterwards. The extraction took place when she was over five years of age; she must have put it in when between two and three years of age. The body was a cherry-stone, so completely covered over with thick, firm, almost fibrinous deposit, that the probe in touching it did not convey the feeling which one usually expects in the case of a hard substance. I hooked it out because I saw it moving when touched by the probe."

Each of these three cases made a good and rapid recovery on the foreign body being removed. In each the presence of such a body was unsuspected prior to my being consulted; in each the "disease" (for all were supposed to be suffering from a disease) was entirely confined to one nostril; in each, too, there was a purulent discharge of a stinking character, of which the amount and degree of fetor varied with the character of the foreign body rather than with the duration of its residence in the nostril. In the first case, although it was of only six weeks' standing, the stench, discomfort, and acrid discharge were as

great as in any case of ozæna; for the piece of cloth, being porous, retained in its own substance the foul fluids. In the last, that of the cherry-stone, which had been in the nostril three years, the irritation was but slight, the discharge trifling, and the fætor of the breath perceptible only at close quarters.

Now, one may feel very certain that the cause of unilateral purulent nasal discharge in a patient of tender years is a foreign body. Ozæna from other causes, even if at first one-sided, becomes very shortly observable in both nostrils; and it was a knowledge of this fact in these, as well as in other similar cases, which led me to a correct conclusion in regard to them. I mention this fact to you now, and lay emphasis on it, because the same is, I believe, true in regard to the remote results of a foreign body in a bronchus, and the knowledge of this fact may be equally useful in leading you to a correct diagnosis of the case. In a conversation which I had some time ago with my friend Mr. Godlee, of London, whose experience in chest-surgery has been a large one, I learned that he had come to regard unilateral chest-disease in a child, with signs of cavity and with purulent expectoration, as being very frequently caused by the presence of a foreign body; and I feel sure that when such disease persists for a lengthened period, the other side of the chest remaining sound, or only becoming involved at a later period by infective processes, such a diagnosis will seldom be wrong.

In one set of such cases—and they always occur in young children—there may be no suspicion of the presence of a foreign body until it is brought to light, in the happy few, by being coughed up, or is revealed, as is more common, by a post-mortem examination. Let me illustrate this by the details of one or two cases. My friend Dr. Dougan, of Springburn, once gave me a little piece of delf, evidently a fragment of a teacup or saucer, which had the following history:

On August 22, 1875, he began to attend a little girl on account of serious mischief in the chest, entirely confined to one lung,—I believe the right. Her illness was characterized in the first instance by signs of consolidation and bronchial râles, and later on by purulent expectoration. There was much cough and constitutional disturbance, with wasting. The disease continued without amelioration, and yet remained confined to the lung in which it originated, until the 16th of October following, when the child coughed up the fragment of delf referred to. Improvement at once began, and complete recovery was the result.

A somewhat similar case, in which the foreign body, however, was of such a character as to favor the occurrence of rapid putrefac-

tive processes in the chest, and which led to an early disastrous result, has been put on record by Dr. Napier, of Crosshill, in the *Glasgow Medical Journal* (January, 1885, p. 11). "The patient was a healthy boy, four years of age, and was first seen by me on the evening of Sunday, October 12, 1884," writes Dr. Napier. "His mother stated that he had been noticed to be ill only from the Wednesday previous,—that is, about four days before; he had been dull, feverish, listless, suffered from entire loss of appetite, headache, and had a very furred tongue. This was thought to be a stomach attack, and was treated domestically, but ineffectually, by gray powder. From the Wednesday evening he had had a short, peculiar cough, accompanied by what is described as a suppressed sneeze; this symptom, of much importance when considered in connection with the cause of the disorder, had quite disappeared on Sunday, and was never afterwards noticed. It was mentioned to me on Sunday, but little importance was ascribed to it, as there was no history of a foreign body having passed into the air-passages; and from the symptoms presented no such event suggested itself to my mind. On the evening of Sunday, October 12, the little patient was found to be in a high fever, temperature 103° F.; pulse very fast, at least 140; respirations 70, accompanied by a painful catch at the end of inspiration, and an obvious working of the *alæ nasi*. There was a frequent short cough, but no expectoration. Tongue moist and coated with white fur. Severe pain was complained of, and referred to the pit of the stomach. This persisted throughout the whole course of the case, and was the symptom most often mentioned by the patient himself. At no time was the pain referred to the lung or near the part at which the foreign body was afterwards found. On physical examination there was discovered comparative (not absolute) dullness to percussion on the right side, posteriorly, from the base of the lung up as high as the middle of the scapula; there were no râles, but a comparatively feeble respiratory murmur. The interior of the throat was slightly congested and swollen. At this, my first visit, the idea formed of the case was that we had to deal with an impending pneumonic attack, and such was the announcement made to the parents." The little patient continued to progress, without exciting any very serious alarm, until October 20, when Dr. Napier notes that "the cough became frequent and teasing, and on this day distinctly purulent matter began to come up with the expectoration. The pus was thin and fluid, soon became very abundant, often appeared with little or no mucus, and from the first had a fetid odor, which, however, became more marked in the course of a few days. . . . The odor was that of

decomposing pus, and not the sickening odor characteristic of ordinary pulmonary gangrene." No improvement occurred in the child's condition; he continued to go from bad to worse, and died on the 1st of November.

A post-mortem examination was made forty-eight hours after death, and the following sentences are from Dr. Napier's report of it: "The left lung and the heart were normal. The right lung was solidified throughout. The upper lobe was perfectly non-adherent and smooth, and in it the hepatization was red and apparently recent; it contained no abscesses. The lower lobes were adherent; the adhesions to the diaphragm were particularly firm. These lower lobes had a dirty grayish-green appearance and a very fetid odor. On making a deep vertical incision into the lower lobes from the front, numerous abscesses, some as large as a walnut, and all having fetid contents, were opened. On removing the lung and slitting up the bronchus, a foreign body was found firmly lodged beyond its first subdivision, blocking up the bronchus communicating with the two lower lobes. The foreign body was embedded in a deep groove in the side of the bronchus, and the mucous membrane round this groove was deeply injected. The air-passages below this point were full of stinking pus." The foreign body proved to be the pith of some plant, probably the elder-bush, which grew in abundance near the boy's residence. "It was seven-sixteenths of an inch in extreme length, five-sixteenths of an inch in diameter, and weighed four grains, being light, therefore, considering its size."

A still more remarkable and instructive case is one which was under the care of my colleague Professor Gairdner, in this hospital, a few years ago, which I had the opportunity of seeing. The boy was eleven years of age, but the first symptoms of his chest ailment showed themselves when he was two and a half years old. There was no history of any fit of choking with a foreign body. I will quote the main facts of the case from a short account of it given in the *Glasgow Medical Journal* (January, 1886, p. 40).

"This case was of great importance not only as illustrating an unusual form of disease in the lungs, but as involving the unsuccessful performance of an operation only recently recommended in the case of basal cavities,—viz., the attempt at opening and drainage from without. In connection with this, the following brief summary, which was drawn up in March, 1885, by Dr. Gairdner, with a view of being submitted to Dr. Douglas Powell, may be adopted as the basis of the abbreviated report, the patient having at the time been under medical

treatment without any appreciable result whatever (except very gradual loss of strength, as stated in this summary, and evidently tending to a fatal issue), for six months from the 9th of September, 1884.

“Boy, aged eleven, fetid (gangrenous?) and purulent expectoration (no tubercular bacilli detected), probably proceeding from one large or several smaller excavations in the lower lobe of the left lung, posteriorly. The existing symptoms were of four years’ duration on admission, but with a history of ‘inflammation’ on left side at two and a half years of age, followed by recovery and good health till seventh year, when ‘inflammation’ was renewed. Continuous expectoration of the kind described ever since. Well-marked deformity (retraction) of left side, but whether due to first or second attack, no information. Emaciation slight or perhaps absent. Febricula quite exceptional, temperature most commonly normal (tending, however, to rise more of late, March 16). Incipient clubbing of finger-ends (probably only since admission). A single intercurrent attack of diarrhoea, not persistent or formidable. Hæmoptysis—apparently insignificant under the circumstances—very trifling and accidental. Bronchitic râles, mucous and wheezing, scattered through both lungs. Questionable state of apices, but apparently no advancing disease there. The more marked—and especially the cavernous—phenomena confined to the left lung, above and below the angle of the scapula, three and a half inches from the spine.”

Dr. Gairdner requested Dr. Finlayson to make an independent examination of the case and to draw up a short statement for submission to Dr. Powell, with a view to obtaining his opinion as to the propriety of surgical interference. This Dr. Finlayson did in the following terms:

“There is no doubt one large cavity, if not several, in this boy’s lung. On getting him to stoop down to touch the floor, thin homogeneous pus ran out of his mouth, exciting, as it did so, much coughing, which came in paroxysms like whooping-cough. Pus to the extent of four and a half ounces flowed out in this way; probably more could have come, but the position was changed, as the boy was getting fatigued and breathless with the process and with the stooping. The pus has a very distinct fetid odor, but by no means suggestive to me of the regular gangrene of lung. A few slides examined failed to show lung-tissue, which may be said to be at least not abundant, but more searching would be required to judge correctly. There are no splashing sounds on shaking the patient, and the idea of the pus coming from the pleura may, I think, be dismissed. The physical signs point

to cavity in the situation referred to in Dr. Gairdner's note,—viz., below left scapula; but the diffusion of the râles above this, and also on the other side of chest, seems to show that the mischief is in no sense limited to the region named. The chronic course, the repeated ejection of fetid pus for years now, the retracted lung, the old pleurisy, all seem to me to point to chronic phthisis, with retraction of lung and fibrous changes, and to the retention of pus in dilated bronchi. The chances are that several such exist, and that the right lung is involved as well as the left. No doubt if the surgeon was fortunate in hitting on the dilatation below left scapula, and could empty and wash it out, some improvement might result; but I fear the mischief is too general for anything like a 'cure' by surgery. I am not, however, averse to its being tried in this situation, as the prolonged suppuration will no doubt lead, if the boy lives, to amyloid degenerations, and the passage of the pus into the trachea is almost sure to set up mischief, with excavation, in the other lung, by its being sucked into the small bronchi on that side, if, indeed, some such condition has not already been set up."

I was present at the operation performed on this boy by one of my surgical colleagues at the request of Dr. Gairdner. The cavity in the lung was reached through an intercostal incision made over it; but, as the layers of the pleura were non-adherent, the fetid pus gained access to the pleural cavity, and the temperature rose three days afterwards to 105.4°, death taking place on the following day.

Dr. Joseph Coats, in demonstrating the anatomical condition at a meeting of the Pathological and Clinical Society, mentioned that "the lung had been laid open in the dead body without any idea of the existence of a foreign body, and without that degree of care which such a suspicion would have suggested. On making the first incision the foreign body was encountered by the knife, and was very possibly shifted from its proper seat. The foreign body consists of a small split iron tube nearly three-quarters of an inch in length and an eighth of an inch in diameter. It is smooth and clear-cut at one end, and rather ragged at the other, as if broken off. It has the appearance of having been a part of a pen the writing part of which had been broken off. It was found in an irregular cavity continuous with that in which the drainage-tube inserted during the operation was found. A long piece of drainage-tube had been inserted and was doubled up in the cavity which possibly might have been made during the operation, or by the drainage-tube. This cavity had no apparent connection with a bronchial tube, and this rather supports the idea that the foreign body had been carried into it by the knife. There were numerous other cavities

formed by bronchiectasis in the lower lobe, and the foreign body was probably originally in one of them, but carried out of it at the post-mortem examination in the way indicated above. In fact, the whole lower lobe was converted into a congeries of such cavities, which were separated by fibrous tissue, there being no trace of proper pulmonary tissue remaining. This part of the lung is devoid of pigment. There was a large cavity in the upper lobe of this lung, which had probably originated by gangrene, as it had none of the characters of a bronchiectatic cavity. There was also a small cavity at the apex of the other lung. A very remarkable feature in the case is the absence of adhesion between the two layers of pleura over the affected lung. At the time of the post-mortem examination there was recent adhesion, from the inflammation following the operation, but, apart from this slight gluing, the two layers of pleura were non-adherent except near the apex."

In all these three cases no suspicion was entertained of the presence of any foreign body in the chest; but another class of cases present themselves, in which the patients, being more advanced in age, give an account of some fit of choking and "swallowing" of a solid body, and they *invariably* retain the conviction that their chest-disease is caused by the presence of that body,—a conviction which, curiously enough, is rarely if ever shared by the medical men whom they consult. The history of the original fit of choking and entrance of a foreign body is often remote. A more or less prolonged period of almost undisturbed health is enjoyed after the accident and before the chest illness begins to be complained of; and, lastly, the signs of the phthisis do not seem strikingly unusual or disorderly, and appear to require no special explanation. These facts lead most practitioners to disregard the explanation of the patient, the more so, perhaps, as all have daily experience of how unreliable patients' opinions of cause and effect in relation to the origin of their diseases usually are. I shall illustrate this class of cases by citing two examples.

In the summer of 1880 I was asked to see a female child, aged nine years, who was suffering from severe pulmonary mischief, which she and her mother believed to be due to the presence of a damson-stone in her chest.

The medical men, in consultation with whom I saw the case, had recently been called in, and had come to share their opinion. One day, thirteen weeks previously, this child, who had just been eating bread and damson jam, and was still sucking a damson-stone, began to play with a cat. The movements of the cat made her burst into a sudden

fit of hearty laughter, and immediately an alarming paroxysm of choking and suffocation occurred. Her mother, who was present, thought her dying, but after a time the attack passed off. On the arrival of a neighboring doctor, who had been hurriedly summoned, she seemed quite easy, and he concluded that the damson-stone, which she said had caused her choking, had passed into the stomach. Recurrent paroxysmal fits of coughing and choking led her parents to consult more than one medical man, but they all expressed doubts as to any foreign body being responsible for her symptoms. She then became a patient in one of our general hospitals, where she remained a fortnight under observation. The surgeon in charge of her case dismissed her at the end of that time, telling her relatives that he could see no reason for believing that there was a foreign body in the chest, and giving it as his opinion that there was some bronchitis of the left side of the chest, which, with care, would doubtless be recovered from. When I saw her she was extremely ill: emaciation was well marked, fever maintained, night-sweats profuse, cough most harassing and constant, and there was a copious purulent expectoration. My friend Dr. Samson Gemmell also saw her, and had no difficulty in making out signs of cavity in the front and upper part of the left lung, which appeared to be consolidated throughout. The right side of the chest was to all intents and purposes free of any signs of pathological change. We both felt very certain that the child's explanation of her own illness was the correct one, and we decided that I should operate without delay. These views were greatly strengthened by an interesting observation made by the child shortly before we saw her. She had for long suffered from no suffocative paroxysm such as accompanied the original entrance of the damson-stone into her larynx, but one day, while coughing, a very similar and most alarming paroxysm ensued. As soon as she had sufficiently recovered from this to be able to speak, she said to her mother, "Mother, it's loose again;" indicating thereby that the body impacted in the chest had been once more coughed up, perceptibly to herself, into the larynx. This occurred several times, and so much did she dread the suffocative attacks that she hit upon an ingenious device for preventing the entrance of the stone into the upper part of the air-passage. Whenever she felt herself about to cough, she firmly grasped the sides of her trachea at the root of the neck between her finger and thumb, and, by lateral compression of it, was able to bar the progress of the foreign body upwards. This she was easily enabled to do by the attenuated state of her neck.

On the day following Dr. Gemmell's examination I performed

laryngotomy. On introducing the points of dissecting-forceps and separating them so as to open the wound, a fit of coughing ensued and the stone was shot out. An uninterrupted recovery followed.

I saw this patient, now twenty-one years of age, quite recently, and found her in good health. When speaking about her case, I remarked, "Although all the doctors were of opinion that the damson-stone was not in your lung, you yourself always thought it was." She answered, very emphatically, "I always *knew* that it was."

The second case which I shall narrate in this connection is a striking one, with which I had no personal concern, although I heard the details of it at the time of its occurrence from professional friends connected with its management. A young man who had on one occasion, while partaking of food, choked with some hard substance, became ultimately very ill with chest-disease. He seems to have been strongly impressed throughout his illness with the belief that this fit of choking had been caused by the entrance of a foreign body into the air-passages, which in its turn was the cause of the chest-trouble. This opinion does not seem to have been shared by his medical advisers, either in this country or in the south of France, where he spent a winter. His illness proved a fatal one, and post-mortem examination demonstrated the truth of his own view,—that a foreign body was in the chest. Dr. Joseph Coats, who conducted the post-mortem examination, communicated the facts of it to the Glasgow Pathological and Clinical Society. This communication is briefly reported in the *Glasgow Medical Journal* of January, 1877, as follows :

"Dr. Joseph Coats showed a piece of mutton bone which had been impacted in the left bronchus for seventeen months, and had caused death by gangrene of the lung. The case was taken at first for one of acute phthisis, cavities having rapidly formed in every region of the left lung. But latterly the symptoms of gangrene—especially excessive and fetid sputa—became more pronounced, while the right lung remained almost free. The piece of bone was part of the vertebra of a sheep, which measured in one direction three-fourths and in another half an inch. It was found in the main bronchus of the left lung, where it had caused ulceration of the mucous membrane, so that it lay in an irregular cavity with an ulcerated internal wall. This lung was firmly adherent in every part, and its tissue leathery and non-crepitant. It was honey-combed with cavities, which were not large in size, but existed in every part. No large gangrenous portion was found. The right lung was fully inflated, and extended beyond the mediastinum in correspondence to the contraction of the left. It contained two small

cavities, having very much the appearance of metastatic abscesses. In answer to the question whether this piece of bone was within reach of removal by tracheotomy, Dr. Coats said that he was led to believe that the serious symptoms were developed at a time when their relation to the existence of a foreign body might be doubtful, and that there were at least no very early symptoms of such urgency as to suggest a serious operation."

Let us now turn to consider the effects produced by the presence of foreign bodies in the larynx, the part of the respiratory passages more richly endowed with sensibility. You have learned from the case of the little boy down-stairs, as well as from some others which I have narrated, how violent are the symptoms of suffocation produced by the first entrance into the larynx of a foreign body, and how quickly and completely all irritation often subsides when the body has snuk into the chest, to be renewed, however, on each occasion of its being again coughed up into the larynx. This difference in behavior is abundantly explained by the difference in innervation of these parts. The mucous membrane of the larynx and laryngeal aspect of the epiglottis is supplied by the superior laryngeal nerve, while the lingual aspect of the epiglottis receives its feeling from branches of the glosso-pharyngeal, a nerve of the tongue. The consequence is that when the epiglottis, during swallowing, acts as a valve and closes the air-passages, food, it may be even of a hot and stimulating character, comes freely into contact with its upper surface without exciting the least discomfort. If the smallest particle of food or a drop of liquid, however, slips past the epiglottis and comes in contact with the mucous membrane of its under surface, or of the larynx proper, then at once follows violent coughing; and, in the case of retention of any foreign body of appreciable size within the larynx, there comes on immediately the dreaded spasm of the glottis, with suffocation, paroxysms of coughing and "cock-crowing," lividity of the face, and all the appearances of impending dissolution. The mucous membrane of the trachea and bronchi is much less sensitive, being supplied by other branches of the vagus given off lower down; and, as we have seen, a foreign body may repose in those parts so quietly as to escape all further attention until inflammatory symptoms are aroused by its presence. But the same spasm as characterized its entrance originally will be repeated as often as, becoming loosened, it is coughed back into the larynx, while its escape into the mouth will be thus barred, and danger of death on each such occasion incurred.

This hypersensitiveness of the upper part of the air-passages is the watch-dog, whose duty it is to guard against the entrance of any

intruder, but, with the want of discrimination of the watch-dog, it also prevents the return of such as may have entered in spite of its vigilance. The consequence is that every patient who has a foreign body in the trachea or in a bronchus is in constant danger of sudden death, unless an artificial opening be made at once, either in the trachea or larynx, as may be deemed most advisable.

In 1875, when I was a surgeon of the Royal Infirmary, a boy was one day admitted under my care, who was said to have been nearly killed a few hours previously by a choking fit which followed the slipping backward into his throat of a horse-bean. On seeing him, my house-surgeon felt so satisfied, from his apparently comfortable condition, that no foreign body could be in his air-passages that he was at first disposed to send him home. He was, however, kept in the ward until my arrival. His mother gave me a very clear account of the accident, describing graphically the sudden and alarming suffocation. This was followed, she said, for half an hour or so by "whistling breathing," occasionally interrupted by sudden coughing. Gradually, however, he subsided into the comfortable condition in which he was on admission. On examination of the chest, there was a very marked diminution—indeed, almost a complete absence—of the respiratory murmur on the right side. Otherwise there was nothing to attract attention. On the following morning he was seen by several of my colleagues, most of whom rather doubted the fact that the horse-bean was in the right bronchus, and I again delayed, I regret to say, any operative interference. The boy was kept in bed and remained perfectly well and happy until the afternoon of the second day after admission, when he was observed by the patient in the bed next to him to have been suddenly seized, while sitting up and playing with toys, with a violent fit of choking. The nurse was summoned, and found him dying, the sphincters having given way and the discharges of both bowels and bladder having escaped into the bed. On the arrival of the house-surgeon the boy was dead. On post-mortem examination the horse-bean was found lying loose in the larynx and in no way mechanically obstructing it. His death had clearly been caused by a spasm of the glottis following immediately upon the coughing up of the bean into the highly sensitive parts where it was found after death.

The issue of this case is one which I have never ceased to regret, and it was the knowledge of the danger of delay which led me to perform tracheotomy in the case of the boy who is still in our wards, immediately on his admission. Fortunately, in his case I was able to extract the stone as soon as I had opened the windpipe. When this

is so, nothing can be more satisfactory. But, even in cases where the surgeon fails at once to seize and extract the foreign body, his having opened the air-passages is of service by preventing all risk of such a fatal issue as I have just narrated; and, further, as I shall now proceed to explain, the chance of the body being coughed up and expelled by the natural passages is rendered by this course much more probable; not to mention the chance of its being any day extracted by the wound, when circumstances appear to justify renewed attempts by the surgeon.

It is an interesting clinical fact that, after the trachea has been opened and breathing has gone on for some time by the artificial channel, the sensitiveness of the upper part of the larynx is often greatly diminished, and, in consequence, its ability to keep out food, especially food of a liquid sort, during swallowing, is much interfered with, so that milk and other fluids will escape in large quantity from the tube. I have observed this occurrence in many cases; and in one, of which I have notes, it was so marked as to interfere seriously with the nourishment of the patient.

This was the case of a little girl, on whom I operated on account of threatened asphyxia during a severe attack of diphtheria. The operation was performed on March 16, 1879, with the assistance of Drs. Maclaren and Granger, who were in attendance upon her. On the 18th she was very ill with bronchitis. On the 20th albumin appeared in the urine for the first time, but it was found only in small quantity and occasionally. On the 22d the albumin was abundant, and from that time it was constantly present until April 3, when, for the first time, the urine was found entirely free from it. On the 26th of March fluids taken by the mouth were occasionally coughed out, in small quantities, through the tube, especially fluids at all stimulating, such as port wine and water, the juice of orange, etc. On the 27th, all liquids swallowed, including milk and water, escaped by the tube in large quantities; this free escape of fluid continued uninterruptedly until the wound, after the removal of the tube on the 4th of April, had contracted to a very small size. It was so free that at one time quite one-half of all the milk swallowed was received in a saucer held by the nurse firmly against the lower part of the neck. On this account the question of maintaining her nutrition became a very serious one, and, on Dr. Granger's suggestion, she was fed with milk which had been made into curd, and in this solid form she was able to swallow all of it. By this simple device the difficulty was overcome, but she was still allowed to take as much fluid milk as her

thirst inclined her for. She never seemed to dread its entrance into the larynx, and quite unconcernedly aided its escape into the saucer by a gentle gurgling cough, while at the same time she continued to drink from the vessel at her mouth. In this way she seemed to be able to prevent any of it from passing into the chest. She ultimately made a complete recovery, although she suffered for a time from marked paralysis of the ciliary muscles and some slight paralysis of the lower limbs.

Many explanations have been offered of this peculiar complication in the after-treatment of tracheotomy cases. It is never observed until some days after the operation, and is not unfrequently supposed by the medical attendant to be due to ulceration into the œsophagus by the pressure of the end of the tube. But that this is not so is proved by the fact that all difficulties connected with swallowing cease as soon as the tube has been removed, and the circular granulating wound has contracted sufficiently to bring its sides into apposition, and so put a stop to breathing in the neck. Nor is the occurrence due to the presence of the tube preventing the trachea from rising during deglutition (Holmes, "Surgical Diseases of Children"), because, if one removes the tube, milk will still escape with equal freedom by the patent wound; and I have seen it occur freely in a gaping suicidal wound in the neck, in which a portion of the thyroid cartilage had actually been cut out. In this case the œsophagus was entire, and the escape of liquids did not occur for more than a week after the infliction of the wound. Once more, it is not to be accounted for by a diphtheritic paralysis of the muscles concerned in swallowing (Spence, Buchanan, and others), since it occurs in cases other than those of diphtheria. Mr. Bryant has recorded an instance in which it proved a troublesome complication, where the tracheotomy was undertaken for œdema of the glottis in a child who had shortly before swallowed a quantity of hot liquid (Guy's Hospital Reports, vol. vi., 3d series). Besides, I am not aware that paralysis of deglutition in diphtheria ever leads to the entrance of fluids into the larynx, as it is more liable to occasion their return by the anterior nares.

All that need be said at present (for I will not pause to attempt any physiological explanation of the occurrence) is that in these cases the larynx has lost for the time that extreme sensitiveness and alertness of muscular spasm which usually succeed in preventing the ingress of anything foreign. But what concerns us most at present is the fact that it also loses, after breathing has been fairly established through the neck, the tendency to prevent the escape through the glottis, by the

same sort of spasm, of any body which has gained accidental admission to the air-passages. Hence one great advantage of early opening the trachea, since afterwards a body may be coughed out of the mouth which before the operation would be more likely to cause a fatal asphyxia by spasm than to effect its escape. No case can better illustrate this than that of the famous engineer Mr. Brunel, reported by Sir Benjamin Brodie (*"The Works of Sir Benjamin C. Brodie, collected and arranged by Charles Hawkins, F.R.C.S.,"* vol. iii. p. 124). Mr. B. on one occasion, when amusing some children after dinner, placed a half-sovereign in his mouth. By accident it slipped behind the tongue, and a violent fit of coughing, in which he had the appearance of being nearly choked, was the consequence. This occurred on the 3d of April, 1843. In the course of the evening he coughed at intervals, but the cough was not violent. For the next few days he suffered little or no inconvenience. For a week or two he was able to attend to business and even occasionally travel into the country, but suffered more or less from cough. He found, after a time, that if he placed himself in a prone position, with his sternum resting on a chair and his head and neck inclined downward, he immediately felt a loose body slipping forward along the trachea. Violent convulsive cough ensued. On resuming the erect posture, he felt it move back towards the chest. Afterwards he placed himself, in order to make the experiment in a more complete manner, in the prone position on a platform made to be movable on a hinge in the centre. "The shoulders and body having been fixed by means of a broad strap, the head was lowered until the platform was brought to an angle of about 80° with the horizon. At first no cough ensued; but on the back, opposite the right bronchus, having been struck with the hand, Mr. B. began to cough violently. The half-sovereign, however, did not make its appearance. This process was twice repeated, with no better result; and on the last occasion the cough was so distressing and the appearance of choking was so alarming that it became evident that it would be imprudent to proceed further with the experiment unless some precaution were used to render it more safe." Tracheotomy was performed a day or two afterwards, and some unsuccessful attempts made to find the half-sovereign with forceps. On a second occasion similar attempts were renewed, but only with the result of exciting violent convulsive action of the diaphragm and abdominal muscles on each introduction of the forceps. Sixteen days after the tracheotomy had been performed it was resolved again to invert him on the movable platform, now that a safety-valve was established and danger from a spasm of

the glottis was so removed. "On the 13th of May," Sir Benjamin Brodie writes, "the patient having been placed on the platform, and brought into the same position as formerly, the back was struck with the hand; two or three efforts to cough followed, and presently he felt the coin quit the bronchus, striking almost immediately afterwards against the incisor teeth of the upper jaw, and then dropping out of the mouth; a small quantity of blood, drawn into the trachea from the granulations of the external wound, being ejected at the same time. *No spasm took place in the muscles of the glottis, nor was there any of that inconvenience and distress which had caused no small degree of alarm on the former occasion*" (the italics are mine). In some further remarks on the case, Sir Benjamin Brodie writes, "Although, before the opening was made, the experiment of inverting the patient on the platform was productive of a most distressing and long-continued spasm of the muscles of the glottis, no such spasm occurred afterwards. The half-sovereign escaped through the aperture of the glottis as easily as it would have done in the dead body."

Let me now draw some practical conclusions which appear to me fairly to follow upon the facts which I have laid before you:

1. Discharge from one nostril in a child, continued for weeks, months, or even years, will always be found to be due to a foreign body. If very stinking, the foreign body will in all likelihood be porous and capable of absorbing and retaining fluids in its own substance. The ordinary ozæna of childhood always affects, sooner or later, both nasal cavities.

2. Unilateral, serious, and progressive disease in the chest of a young child, or with a history dating back its commencement to early childhood, will, I believe, almost as certainly be found to depend on the presence of a foreign body. At first the ailment will be characterized by distressing cough, with more or less consolidation and bronchial discharge. Ultimately purulent expectoration, with physical signs of cavity and all the usual indications of a pulmonary phthisis, will be established. The expectorated discharge, as in the case of the nostril, will be very fetid, or less so, according to the character of the imprisoned body.

3. A similar condition of the chest, markedly one-sided, in the adult who tells a story of alarming choking with some small object in the mouth, which was successfully "swallowed," is also, I believe, invariably due to the presence of a foreign body. The diagnosis is as certain as any circumstantial diagnosis can be, especially if the patient strongly expresses the belief that the body is in the chest and that it

is the origin of the ailment. This is one of those statements which ought not to be disregarded, as all experience shows, and yet the tendency of almost all medical men is to attach little or no importance to it.

4. As soon as one is satisfied that the foreign body is in the chest, a tracheotomy ought to be performed. If extraction by forceps seems possible, it ought to be attempted. If unsuccessful, the wound must be kept open and respiration through it maintained, not only as a safety-valve against the dangers of spasm of the glottis, but also that further experiments may be made, either with forceps or by exciting coughing, while the patient is in the inverted posture, as may seem best.

5. When serious chest-disease has supervened, and unmistakable signs of ~~activity~~ exist in a lung, attempts may, in certain cases, be successfully made to open the cavity by operation, with a view to its thorough irrigation and drainage, as well as with the hope of extraction of the body, or its ultimate expulsion in the discharges washed out by the irrigator. If such operation be undertaken, one must be prepared to find the two layers of the pleura still non-adherent, unlikely as this may at first sight appear. We have seen that they were so in Dr. Gairdner's case, and this circumstance was really the cause of the failure of the operation. In this connection Dr. Gairdner is reported to have made the following very important remarks when his case was submitted to the Glasgow Pathological and Clinical Society.

"Dr. Gairdner remarked that in his whole pathological experience he does not remember to have ever encountered so complete a disorganization of a considerable portion of the lung, extending over a period of years, yet with such an absence of adhesions, which was therefore, in the present case, a wholly unexpected condition, the more remarkable, perhaps, on account of its contrast with what was exhibited in the immediately preceding case, in which a bronchiectatic lesion, presumably originating out of catarrhal conditions, was associated with a generally adherent state of both lungs, with particularly firm adhesions over the seat of excavation. Dr. Gairdner, however, directed attention to the well-known pathological fact that while typical (so-called croupous) pneumonia and tubercular disease are, as a rule, attended by pleural adhesions corresponding closely with the extent of lung involved, or even in some cases in advance of the pulmonary lesion, catarrhal pneumonia, on the other hand, frequently runs its course without the pleura being inflamed during the acute stage, or adherent afterwards. It seems just possible, therefore, that a

lesion depending essentially on the impaction of a foreign body in a bronchial tube may preserve, through its evolution, more nearly a relation with catarrhal than with other inflammations."

These considerations must be borne in mind in attempting to reach such cavities. Free access to the part must be gained by excision of portions of rib. If the two layers of pleura are found to be non-adherent, it will be well to content one's self with endeavoring to excite adhesion between them in the first instance. This may probably be best done by the introduction of stitches, as Mr. Godlee has advised. The subsequent opening of the pulmonary cavity at a later date will be a comparatively safe procedure, if success follows the earlier part of the operation. I have myself, however, had no experience of operations of this kind.